A.R.B. APPROVALS COMPENDIUM

Issue 1
1st February, 1966

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FOREWORD

1 PURPOSE This Compendium has been prepared to give general information on the Board's requirements and procedures for the approval of firms in the civil aircraft industry. It outlines the principles of approval and gives information as to how an approved organisation should be operated.

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2.1 The Compendium is a collection of documents selected from various A.R.B. publications.

2.2 Section A of British Civil Airworthiness Requirements (B.C.A.R.), which deals with "General Information and Procedures", forms part of the Compendium. (The publication B.C.A.R. constitutes the basis on which recommendations for the issue of Certificates of Airworthiness are made by the Board to the Minister of Aviation.)

2.3 Six leaflets from Civil Aircraft Inspection Procedures (C.A.I.P.) dealing with basic approval requirements are included in the Compendium. Owing to the wide variation in the nature of the work undertaken by firms engaged in aeronautical engineering, further information contained in C.A.I.P. may be of interest, and a Contents List for this publication is therefore included. (The publication C.A.I.P. deals with various aspects of construction, overhaul and maintenance; it includes recommended practices related to workshop methods, processes and testing, and information considered essential to the proper understanding of the Board's requirements.)

2.4 A pamphlet entitled "The Air Registration Board, Its Formation and Functions", which contains information of general interest, has also been included.

Note: As the Compendium consists of a collection of documents which are in themselves self-contained, some repetition is unavoidable.

3 ISSUE AND AMENDMENT One copy of the Compendium will be supplied, on a complimentary basis, to firms holding A.R.B. approval and to firms who have applied for approval. Amendments will be supplied, also on a complimentary basis, whenever any of the relevant publications are amended.

4 APPLICATIONS AND ENQUIRIES Additional copies and amendments may be obtained from the Board on repayment and will be supplied on request to the Secretary, Air Registration Board, Technical Publications Department, Greville House, 37 Gratton Road, Cheltenham, Glos.

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Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-1

Issue 2

15*th December,* 1965

BASIC

CONTROL OF AIRWORTHINESS

DESIGN AND INSPECTION APPROVAL

1 INTRODUCTION This leaflet gives general guidance on the procedure to be followed by organisations seeking Air Registration Board approval.

NOTE: Information on the responsibilities of an aircraft inspector, previously given in Issue 1 of this leaflet, now forms part of Leaflet **BL/1-2,** Issue 2.

1.1 As it is the Board's desire to avoid duplication and in order to ensure adequate control of airworthiness, the Board has, in addition to its direct survey work, a scheme whereby suitable organisations can be approved and, under such approval some responsibilities for airworthiness are delegated to the organisation's personnel. This approval can be broadly divided into two categories, one concerning the design aspect of airworthiness and the other the manufacturing and associated inspection procedures.

1.1.1 **Design Approval.** An organisation engaged upon the design of any part of an aircraft is required to obtain approval from the Board. Such an approval can cover a firm designing small detail parts of an aircraft through all ancillaries to the design of a complete aircraft.

1.1.2 **Inspection Approval.** An organisation undertaking the manufacture of raw materials, detail parts, and components up to a completed aircraft is required to obtain inspection approval from the Board. In addition, organisations undertaking the testing of aircraft materials, the overhaul, repair and modification of aircraft, are also required to obtain approval.

1.2 These approvals are in fact an essential first step in the construction of an aircraft as, only in exceptional circumstances, will the Board consider acceptance of an aircraft or any part thereof from a firm that does not carry the appropriate A.R.B. approval.

1.3 The Board's minimum Requirements for the grant and maintenance of these approvals are prescribed in Section "A" of British Civil Airworthiness Requirements (B.C.A.R.), in addition various technical aspects of the approval are more fully covered in various Civil Aircraft Inspection Procedures (C.A.I.P.) Leaflets.

2 DESIGN APPROVAL Any firm normally based in the United Kingdom, may make application to the Board for the type of approval appropriate to their activities. In special circumstances, foreign based firms may also be considered for approval.

2.1 Application in the first instance is by letter and, subject to a preliminary investigation at Head Office, the firm is then required to complete an application form A.R.B. 466. This form requires brief details of the firm's current commitments in respect of Design and any existing approval which they may already hold, together with the names, qualifications and experience of the senior design staff. On receipt of the completed application form, arrangements are made by the Board's Head Office for a Board's

Surveyor or Surveyors to visit the firm in order to investigate in more detail the information provided by the firm in their application. In general certain selected Board's Surveyors handle these matters but, where special products are involved, one of the specialist Surveyors may also be concerned.

2.1.1 The primary responsibility for ensuring that the Board's conditions are satisfied on a day-to-day basis is vested in the Chief Designer and it follows that his qualifications and experience have to be acceptable, and it must be ensured that he has a suitable design team with the necessary numerical strength and qualifications.

2.1.2 In addition, the Board will require evidence of a satisfactory procedure for drawing office control, together with an adequate system for the preparation and recording of technical data, test reports and modifications.

2.1.3 If the Board is satisfied with the Organisation, approval is given in the form of a Schedule with covering letter. This Schedule defines the scope of the design work in respect of which the Board will accept statements submitted by the Chief Designer as complying with B.C.A.R. As added recognition, a wall certificate is also issued to the firm.

2.1.4 Any change in the senior personnel associated with this approval or material changes in the system, must be notified to the Board before they are implemented; in this way the Board is able to ensure that the competency of the organisation is maintained. It is also emphasised that the firm will be responsible for the safe keeping of all design records, documents associated with the type approval of an aircraft, parts or components, repair schemes, etc., and that these records must be made available to the Board if the firm's approval is terminated for any reason.

2.2 **Supervision of Approval.** Subsequent supervision is made by a Board's Surveyor, and reports raised following these visits are placed on record at Head Office. The supervision procedure will depend upon the scope of the Design approval and the firm's current activities. It is, however, based on the procedure used at the initial visit.

2.2.1 Within the terms of the approval the firm may proceed with the design of aircraft or any part thereof including repair schemes, modifications, etc., provided that the Board is kept informed, particularly on those items for which specific design approval is ultimately required, e.g. major modification or new items of equipment. When such notification is received, a Surveyor will visit the firm to discuss the proposed new design and arrange for further supervision, environmental tests, etc., as the Board may consider necessary. Thus the Board has knowledge of the personnel and organisation responsible for the design of any piece of equipment, and is able to make whatever detailed investigation it considers necessary against any specific design before incorporation in an aircraft.

2.2.2 Technical publications, i.e. maintenance and repair manuals, etc., are considered by the Board as an essential part of each specific approval and the firms are required to have facilities, or access to suitable approved facilities, for this purpose; the responsibility for certifying that manuals are prepared in accordance with the Board's Requirements is vested in the Chief Designer, but the Board reserves the right to check manuals in individual cases.

2.2.3 Applications for specific design approval of components or items of equipment, are made formally to the Board and are generally dealt with in one of three categories; component procedure, accessory procedure, or major modifications. The procedure to be adopted in each of the above mentioned cases is laid down in Section "A" of B.C.A.R., but in general terms, component procedure is applied where the part is designed for specific application to a particular aircraft, whereas accessory procedure is applied where the part may be cleared for use in a number of different applications on a varying range of aircraft. In both cases, one of the fundamental requirements is that a firm submitting the application has a written specification which adequately identifies the part in both design and construction and calls up the required testing procedure. Modification procedure is applied when changes are made to a particular aircraft type including the ancillary equipment fitted to that aircraft; in general this procedure is only used when the particular aircraft has been issued with a Certificate of Airworthiness.

3 INSPECTION APPROVAL The Board will accept applications from any firm normally based in the United Kingdom for approval of their inspection organisation to cover the manufacture, overhaul, repair, replacement, modification, and inspection of aircraft, engines, or any part or any material destined for use on British Registered Aircraft, or for which the customer requires release to B.C.A.R. Foreign based inspection organisations may also be considered for approval.

3.1 Application in the first instance is by letter and, subject to a preliminary investigation at Head Office, the firm is then required to complete an application form A.R.B. 454. This form requires brief details of the firm's current commitments and any existing approval which they may already hold together with the name and qualifications of the Chief Inspector. On receipt of the completed form, arrangements are made by the Board's Head Office for a Board's Surveyor or Surveyors to visit the firm in order to investigate in detail their facilities and qualifications. Where special products are involved, one of the Board's specialist Surveyors may also be concerned.

3.2 The policy and general requirements of the Board are explained to the firm's senior management and the firm in turn amplify the information given on their initial application form as to their activities and general policy.

3.3 The opportunity is taken at this time to ensure that the established chain of responsibility in the firm provides for the Chief Inspector to have direct access to the Company's Directors on all technical matters. The Board normally requires that the firm's production personnel have no technical control over the Chief Inspector, or his staff, and that the Chief Inspector has senior status within the firm. The primary responsibility for ensuring that the Board's standards are maintained is vested in the firm's Chief Inspector; it follows therefore that his qualifications, experience and ability are examined in some detail. This is done by personal interview and the completion of a written questionnaire.

3.4 The Board does not prescribe specific qualifications for a Chief Inspector because of the wide variety in the commitments of various firms. Whereas the Chief Inspector of a firm designing and constructing complete aircraft would normally be expected to hold an engineering degree or equivalent, in addition to at least 10 years practical aircraft inspection experience, the Chief Inspector of a small firm producing machined detail parts for aircraft, might be acceptable with no academic qualifications and only 5 years general engineering experience, provided this included at least 2 years practical inspection experience. In all cases the Chief Inspector must have a detailed knowledge of the Board's procedures and must show evidence of a sufficiently strong personality to enable him to enforce the necessary requirements within his own organisation.

3.5 Subject to this interview proving satisfactory, the Chief Inspector is then required to give full details of the inspection organisation and show exactly how it functions from the receipt of raw material until despatch of the final product. Copies of the various forms used by the inspection organisations are retained by the Surveyor, including the firm's proposed layout for the A.R.B. release document (i.e. Approved Certificate as detailed in Leaflet **BL/1-6**). For record purposes form A.R.B. 472 is completed by the Surveyor, this gives details of the firm's inspection organisation and personnel including associated services (e.g. chemists, metallurgists, and radiologists) and the signatories of release documents. Facsimiles of inspection stamps are included and to avoid duplication of design these are cleared through a Government controlled records office.

3.6 The Surveyor then carries out a survey of the various departments in the firm in the company of the Chief Inspector. The survey should start with the Goods Inwards and Quarantine Stores, the Bonded Stores and Goods Despatch Section to ensure that the recommendations of **BL/1-6** have been complied with.

3.7 A survey of the remaining workshops, hangars, etc., is made with particular emphasis on the method of recording work done and the inspection procedure used in each department.

3.8 The Surveyor will also ensure that suitable facilities are provided in each section; this would include the provision of sufficient space, equipment and adequate heating and lighting. The authority of inspection staff, their accommodation and equipment is checked, and the system of providing suitable working instructions, including drawings and process sheets is also examined with the object of ensuring that the designer's requirements are properly interpreted.

3.9 The Board lays great emphasis on the provision of suitable facilities for the periodic check calibration of jigs, tools and gauges, as well as the examination of plating solutions, check calibration of temperature controlling devices, etc. Heat and protective treatment facilities are also examined; the Surveyor will record the available equipment and check the standard of maintenance provided. Continuity of materials and part identity is most important and the firm must be able to demonstrate a system whereby proof of heat and/or protective treatment details can be established simply and accurately.

3.10 It is difficult to give a reliable indication of the workshop facilities that the Board requires for approval; it naturally depends on the scope of the firm's commitments. Whereas a firm manufacturing small detail parts might only be expected to have suitable turning and shaping machinery and associated mensuration equipment, a firm engaged in the complete overhaul and repair of large aircraft, including all ancillary equipment, would be expected to have adequate facilities for overhauling complete undercarriages, power plants, control surfaces, fuel systems, instruments (both mechanical and electrical), electrical and pneumatic components, safety equipment, pressurisation, including cabin heating, aircraft weighing and tank sealing. In the event of the firm not having acceptable facilities for any particular process or overhaul, proof of a suitable contract arrangement with other organisations having A.R.B. approval will be required.

3.11 If the Board is satisfied with the organisation, approval is given in the form of a Schedule with a covering letter. This Schedule defines the scope of the firm's inspection approval. The firm will also receive an Authority Reference Number prefixed with the letters AI followed by the number which consists of four digits and the last two figures of the year in which the firm was approved, e.g. AI/0000/65. In addition, as added recognition, a wall certificate is also issued to the firm.

3.12 Subsequent supervision of the firm is based on periodical visits, the frequency depending on the firm's activities and their ability to maintain high standards, similarly the visits will vary in degree of investigation. The Surveyor is, however, required to ensure that the firm's inspection department continues to exercise effective control and that the Board's minimum requirements are being maintained.

3.13 In addition to routine visits, other visits are made as the need arises. Changes in the senior inspection staff, which must be notified to the Board, any additional inspection facilities and special investigations are situations requiring such visits.

4 CLASS 1 AND 2 CASTINGS AND FORGINGS Firms seeking approval for the manufacture of Castings or Forgings in Class 1 and 2 as defined in B.C.A.R. Section "A" are first required to hold A.R.B. Inspection Approval as defined in paragraph 3. Over and above this the Board will carry out a separate investigation covering the additional requirements outlined in B.C.A.R. Chapters **A7-6** and **A7-9**, and, if satisfied, will write a separate letter of approval to the firm covering the specific work involved.

5 STOCKIST'S APPROVAL In general, this indicates recognition of a Quarantine and Bonded Store (as outlined in Leaflet **BL/1-6**) and the availability of suitable facilities for the work associated with the approval sought.

5.1 The applicant must nominate the Chief Storekeeper and his deputy and must satisfy the Board that they are capable and responsible people with the required experience and that they are conversant with the Board's Requirements and Procedures.

5.2 The form of the Approved Certificate (see Leaflet **BL/1-6**), must be approved by the Board.

5.3 If the store is intended to hold life controlled items, then there must be a system by which the storage expiry date of such items may be readily ascertained.

5.4 Storage conditions must be such that the materials or parts will not suffer any significant deterioration while held in store, and that a system is in operation which will ensure proof of origin of any item held in store. A filing system must be kept for a minimum period of five years after all transactions have been completed, and in any case, must not be destroyed without the prior agreement of the Board.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-2

Issue 2

15*th December,* 1965

BASIC

CONTROL OF AIRWORTHINESS

GENERAL ASPECTS OF AIRCRAFT INSPECTION

1 INTRODUCTION This leaflet gives guidance on the practical aspect and general functioning of aircraft inspection organisations, and should be read in conjunction with Leaflet **BL/1-1.**

2 GENERAL The commitments of firms in the aircraft industry are of such a wide variety that it is impracticable, within the scope of this leaflet, to give more than an outline as to the manner in which an inspection organisation should operate.

2.1 It is essential that inspection organisations responsible for certifying the suitability of a part, should be satisfied that the materials used in constructing the part comply with approved specifications. Similarly it is essential that the inspection organisation responsible for certifying the installation of a part in an aircraft, should be satisfied that the part complies with the relevant drawings and, where applicable, has been satisfactorily tested to an approved test schedule. The approved inspection system covers not only the manufacturing firms but also foundries, laboratories, test houses and firms responsible for overhaul, repair, etc., so that even a part which starts off in a foundry may, before installation in an aircraft, pass through several firms, and the inspection system is such that the origin of a structurally important part can be traced back through any stage of its production to the original basic materials.

2.2 The detailed procedures used by the inspection organisation to ensure compliance with these requirements are not dictated by the Board, except in so far as general principles are concerned, and it is the responsibility of the Chief Inspector to adopt such procedures as appear most suitable to him. The main responsibilities which devolve on the inspection organisation are as follows:—

(i) To ensure that all materials used in the manufacture of aircraft conform to an approved specification.

(ii) To ensure that all parts or components conform to the latest issue of the approved drawings and specifications.

(iii) To ensure that all manufacturing processes and prescribed inspection tests are carried out in accordance with the requirements of the Board and the appropriate order.

(iv) To ensure by means of an adequate and accurate system of records that all parts and materials can be identified and that structurally important parts can be traced to origin at any stage of manufacture.

2.3 An example of the general procedure used between firms, to ensure that requirements are met is as follows:—

2.3.1 In the first instance an approved firm issues the raw material such as a billet, bar or metal strip, certifying it as being in accordance with a particular specification as proved by mechanical tests and/or chemical analysis. These tests are carried out in the firm's own approved laboratories or in the laboratories of some firm approved for such purposes. In all cases, accurate records of the test results and the analysis must be correlated to the appropriate batch of material.

2.3.2 Materials so released are acceptable to a firm who may wish to undertake the conversion of forgings, castings, sheet, etc. On receipt of material at the processing firm, the inspection organisation ascertains that the consignment is accompanied by the Approved Certificate of the supplier (see Leaflet **BL/1-6**). Should this not be the case, the material is held in a Quarantine Store to await identification. When the material has been correlated with the incoming Approved Certificate, the material is transferred to the Bonded Store, access to which is under the control of the Chief Inspector. For convenience, the material may be identified by its actual Approved Certificate number and this should then be entered on the tally card. Whilst this system may suffice where small quantities are involved, the use of a batch book is considered to be a much more suitable method and also provides a means of rapid connection between the material in the bonded store and its incoming documentation.

2.3.3 When work is put into progress in the shops, it is the practice to raise a job card, and when this involves the production of detail parts the batch number of the material issued for the work is entered on the card. The job card quotes the part number of the parts concerned and the quantity to be produced. It also defines the operations involved and the necessary inspection stages. After final inspection the parts are passed to the Bonded Store and the card is filed.

2.3.4 Throughout the course of work, the inspection department must satisfy itself that all processes are executed in the prescribed manner, and finally that the finished articles conform to the approved drawings and that the articles bear the appropriate inspection identification.

2.3.5 Before despatch, an authorised Approved Certificate signatory signs the Approved Certificate subject to presentation of satisfactory evidence of final inspection. This Certificate is issued to cover each separate consignment or part consignment.

2.3.6 The system of inspection and the maintaining of records is basically the same at every firm handling the parts; however, some variation and amplification may be introduced to conform to the general organisation of individual firms and to suit necessary variations in the design and production of components.

2.3.7 Considerable guidance on good engineering practice is already given in other Civil Aircraft Inspection Procedures Leaflets, and the implementation of such practices should assist those concerned with efficient inspection.

2.4 **Drawings.** Section A of British Civil Airworthiness Requirements prescribes that each design drawing must bear a descriptive title, drawing number, issue number and date of issue. It further prescribes that all alterations to drawings must be made in accordance with a drawing amendments system which ensures that design records are suitably maintained. If a design amendment is made to a drawing, a new issue number and date must be allocated to the drawing.

2.4.1 In the construction of prototype aircraft or assemblies, or during the embodiment of major modifications, etc., the production of drawings and components usually run very closely together, and parts made to earlier issues of drawings, and then amended by shops queries, concessions, salvage schemes, or design office instructions, are frequently completed or "brought up" to a later issue of the drawing which includes all the permanent features resulting from the above. A careful system of indexing is necessary to ensure that records clearly show to what stage of development each component has been manufactured and inspected. Thus, on completion of the assembly, modification, etc., it must be possible to confirm that all design changes have in fact been incorporated, and that any unacceptable characteristics have not been included.

2.4.2 Statements on drawings, in design office instructions, and internal specifications, which appear to be ambiguous or vague, should always be queried to ensure that a correct interpretation of the requirements has been made, and the documents should be amended to avoid any future misunderstanding. It should also be appreciated that the inadvertent omission of information from the drawing may not always preclude the possibility of the part being manufactured, yet the omitted information could, in fact, be of vital importance.

2.4.3 In consideration of the above, it is essential that the finalised drawings and associated documents should provide an accurate record of all details, assemblies, systems, etc., of the aircraft when construction is complete. This point cannot be over-emphasised, as subsequent reference to drawing records is frequently made throughout the service life of the aircraft type.

3 **OPERATION OF INSPECTION** Whilst the correctness of parts and the airworthiness of aircraft is its primary function, inspection plays an important part in the overall economic aspect of production and maintenance. In many instances, good inspection control determines whether material defects or manufacturing faults are revealed at an early stage in the production sequence and are brought to the attention of the appropriate department; otherwise considerable material and time can be spent in producing parts which are then found faulty at a later stage, or in which the faults remain undetected to the detriment of safety and the firm's reputation.

3.1 To be efficient, inspection departments must consider all the factors involved in any particular operation. For example, if an inspector is required to check a batch of castings for first stage machining, it would be futile to check the appropriate dimensions and to clear the parts for further processing and to ignore material defects which might be revealed by the machining. Again, there would be no point in carrying out a full dimensional check on light alloy parts manipulated to a complicated shape without first ascertaining that the correct heat-treatment and manipulation procedures had been used. Considerable time can be saved by the introduction of an efficient system of first-off and planned stage inspections.

3.2 Inspection departments should draw up adequate instructions in the form of schedules, and inspection records should be prepared for all stages of production so that individual inspectors can work to set procedures; however, there are numerous occasions throughout the many facets of production with which an inspector is concerned, which cannot be foreseen and detailed in advance. A sound technical knowledge and experience of the production procedure involved are essential qualifications for efficient inspection.

NOTE: The importance of cleanliness during the construction and maintenance of aircraft has a direct bearing on airworthiness, and guidance on this subject is given in Leaflet **BL/1-3.**

3.3 For simple detail fittings which do not bear individual serial numbers, the inspection stages are recorded on the production job card; a suitable space is provided for the inspector's stamp after completion of each operation. In the case of component parts such as ailerons or main structural assemblies, a separate inspection record card is instituted and such parts are given a serial number. Inspection must ensure that component or assembly serial numbers cannot be duplicated.

3.4 As a result of the many materials, processes, and manufacturing techniques associated with the production of modern aircraft, the unexpected can and does, frequently happen; in addition, a simple mistake may occur or an operator may be careless. To ensure the necessary standards of safety, nothing should be assumed to be satisfactory; it should be proved to be so.

3.4.1 "Making sure" is the guiding factor of efficient inspection; no job is so urgent that future safety can be sacrificed and no operator is so efficient that a mistake cannot be made; the following is an example.

3.4.2 The symbol "W" is used on material which has been solution-treated and will respond effectively to precipitation treatment; after precipitation treatment, the symbol "P" is added. Taking an instance where a part has been submitted for final inspection bearing only the symbol "W", yet the inspection record has been endorsed by an inspector to the effect that the full heat-treatment has been applied and that the part has been tested for hardness. A mistake has obviously been made, i.e. either the card has been incorrectly endorsed or the marking of the part has not been completed.

3.4.3 The inspector must take the necessary action to ascertain the condition of the material and whether the full heat-treatment has been carried out. In no circumstances should the endorsement on the card be assumed to be correct; steps should be taken to ensure that the stage inspection procedure is improved to avoid the repetition of such mistakes.

4 CORROSION PREVENTION The prevention of corrosion is always a very important consideration, and with modern aircraft structures, of vital importance. It is now usual for protective treatments to be called up by process specifications or standards, and for the symbols of these to be referenced on the drawings.

4.1 The responsibilities of inspection departments regarding corrosion prevention are threefold, i.e. (a) to ensure that detail drawings specify the treatment to be applied to the parts, and that assembly drawings indicate the treatment to be applied to faying or mating surfaces and finished assemblies, (b) to ensure that such treatments are correctly applied and (c) to ensure that the protective treatment is made good at any position where it may have been removed during manufacturing or assembly operations or by mishandling.

4.2 With the exception of instances where it is obvious that future assembly requirements obviate the necessity of applying protective treatments, e.g. where a part is to be welded to another fitting, inspection departments should call the attention of design offices to all instances where reference to protection has been omitted. Where parts are left untreated for any reason, the desirability of temporary protection should be considered.

4.3 For more detailed information on corrosion and protective treatments, see Leaflets **BL/4-1, BL/4-2** and **BL/4-3.**

5 THE INSPECTION OF DETAIL FITTINGS Detail drawings, sometimes in conjunction with firm's specifications, specify all the essential requirements relating to the manufacture of parts, e.g. material specifications, sizes of raw material, dimensions, heat-treatment procedures, methods of identification marking, protective treatments, and, where applicable, direction of grain, standards of surface finish, crack detection procedures, on other requirements.

5.1 Inspection is responsible for ensuring that all these conditions are satisfied, and also it must be satisfied that the planned method of production ensures adequate safeguards of airworthiness standards, that the authorised period during which manipulation after heat-treatment is permitted is adhered to, and that the material is not overworked during this period. Heat-treatment temperatures and methods of quenching must be correct.

When one inspector is not responsible for all production sequences he must nevertheless be satisfied, either by written or physical evidence, that all previous inspection stages not actually witnessed or inspected by him have been correctly performed.

5.2 The inspection should be conducted in a methodical manner. It would be pointless to check all dimensions of a part only to find later that the wrong material has been used; it would be dangerous to forget to check the material at all. A suitable procedure, subject to necessary variations, is as follows.

5.2.1 A check should be made on the materials used, i.e. correct specifications, thickness, diameter, etc., as appropriate, and where applicable, that it is in the correct heat-treated condition. When carrying out inspections to intermediate or final stages, there should be evidence that all previous stages have been cleared by inspection.

5.2.2 The correct identification data (part number) should be applied in the position and manner specified on the drawing. The incorrect positioning of this data or the use of the wrong medium can have detrimental consequences and may necessitate the rejection of the part. (Leaflet **BL/2-1** outlines methods of identification marking for aircraft parts and gives details of inspection stamps).

5.2.3 A check should be made to ensure that the general condition of the part is satisfactory, i.e. that it is free from scratches, scriber marks, tool marks, and cracks at bends, and that edges, cut-aways, and the like are free from burrs which might result in fractures or scoring of skins or other parts during assembly.

5.2.4 Ascertaining the correctness of dimensions is usually the longest operation and should, therefore, be left until last. When making the check, the dimensions should be measured in a methodical manner to preclude the possibility of one or more being overlooked, e.g. it is preferable to check all holes in a single operation rather than to check groups haphazardly. Instruments and gauges of known reliability and accuracy must be used.

5.2.5 Note should be taken of any instructions which may require certain holes to be omitted or not opened to full size, and certain dimensions to be left undersize or oversize to facilitate fitting and assembly requirements.

5.2.6 On completion of inspection, the part should be marked, as appropriate (Leaflet **BL/2-1**), to signify inspection approval, and the inspection record card should be completed. Where a concession has been granted (Leaflet **BL/1-5**), the concession stamp should be applied to the part and details should be entered on the inspection record card.

6 THE INSPECTION OF ASSEMBLIES The inspection of assemblies requires a number of additional factors to be taken into account, and the ability and experience of the inspector(s) concerned are important factors.

6.1 The assembly of a typical component is usually planned in a series of stages, e.g. structure prior to riveting, structure after riveting, skinning prior to riveting, and so on, provision being made for inspection at the completion of each stage. A typical inspection record card for a component is shown in Figure 1. As with the inspection of detail fittings, the inspector is responsible for ensuring that all the requirements of the drawings are met, but again this is not his only responsibility. Some factors relating to the inspection of assemblies are outlined in the following paragraphs, but it should be borne in mind that these factors are presented only as examples.

6.2 The inspection of each stage should follow a logical sequence, and a suitable procedure for an assembly, subject to necessary variations, is as follows:—

6.2.1 Ensure that all parts shown on the assembly drawings are correctly fitted, that they comply with the planned issues of the appropriate drawings, bear evidence of prior approval, and, where appropriate, have been protected against corrosion.

INSPECTION RECORD CARD

J. R. BLANK & CO. Card Ref.: 28/3
TOWN WORKS–SOUTHDOWN Issue No. 2

AIRCRAFT TYPE.....................

COMPONENT: PORT FLAP ASSEMBLY

Aircraft No. .... Jig No. .... Component No. ....
Drawing No. .... Issue No. .... Serial No. ....

Stage	Description	Insp. Stamp	Date	Remarks
1	Assy. in jig. Spar track ribs and end ribs.			
2	Check location of flap carriage.			
3	Assembly of frame complete, less riveting.			
4	Rivet frame complete.			
5	Fit, drill and deburr top skins.			
6	Rivet top skins.			
7	Fit, drill and deburr nose skins.			
8	Rivet nose skins.			
9	Fit, drill and deburr bottom skins.			
10	Internal cleanliness.			
11	Internal treatment prior to fitting bottom skins.			
12	Rivet bottom skins.			
13	Check prior to removal from jig.			
14	Fitting of cable guides, rubbing strips and patch plates.			
15	Fitting of track brackets and rollers.			
16	Fitting of modification and serial plates.			
17	External cleanliness and treatment; check internally for foreign bodies, loose tools, etc.			

Figure 1 TYPICAL INSPECTION RECORD CARD

(i) To reduce to a minimum the possibility of failure by fatigue, all reasonable checks must be made to ensure the complete absence of assembly stresses, and in this connection the correct mating of parts, the correct alignment of lugs into forkends, the absence of bowing in members, twisting and straining of flanges and webs, etc., should be considered. The adequacy of the depth and width of joggles should be checked to ensure that flanges will not be strained into position, or corners of joggles chafed.

(ii) The alignment of holes, the correctness of those positioned or opened to full size on assembly, and the condition and depth of countersinks and dimples should be checked. It should be ensured that no swarf or dirt remains between the component parts of the joint, and that an adequate but not excessive quantity of the specified compound is applied.

6.2.2 A number of inter-stage inspections may be necessary during these operations, depending on the importance of the structure or the method of riveting and bolting used. Where applicable, closing pressures of riveting machines, heat-treatment condition of the rivets, torque loading and the sequence of tightening nuts, or bolts, should be checked.

6.2.3 Information on riveting is given in Leaflet **AL/7-7,** and on the assembly of critical bolted joints in Leaflet **AL/7-8.**

6.2.4 After skins have been fitted, the riveting should be examined and the skinning carefully inspected for damage and areas of slackness. The component should then be checked for correct alignment and positioning of hinge centres, bolt holes, or other locating devices. This is normally done in the jig where all the required dimensions can be readily checked. In the case of aerofoil components, the correctness of contours, e.g. leading edges, should also be checked.

(i) The component should receive a final internal inspection to ensure freedom from all extraneous matter, e.g. rivet shanks, and that the internal protective treatment is undamaged, after which inspection covers should be fitted.

NOTE: In the case of intricate boxed-in type of structures where internal inspection is difficult, reference should be made to Leaflet **AL/7-13** entitled "Internal Inspection of Aircraft Structures."

(ii) A final external examination should be made to ensure that no damage has occurred to the component during handling. A check should also be made to ensure that all apertures through which dirt or loose articles could enter the component are suitably covered. The inspector's final stamp should be applied to the identification plate on the component **(BL/2-1),** and the inspection record should be filed for future reference.

6.2.5 When all the assemblies come together to form an airframe, all the inspection record cards for the various assemblies should be filed together with others indicating the further stage inspections required. These will form the complete record to be identified under the aircraft constructor's number. In many instances a book record is used to record final assembly stages and checks. At this stage, a metal identification plate bearing the constructor's number is permanently attached to the aircraft structure, usually inside the fuselage.

7 INSPECTION OF SYSTEMS The inspection of systems, because of their varied applications and component parts, is difficult to discuss in general terms, but in every case it is essential to ensure that the systems are installed in accordance with the requirements of the drawings and that the specified tests are made. Considerable guidance is given on the inspection of various aircraft systems in other C.A.I.P. leaflets.

7.1 The most suitable method of inspecting any system is to commence at one end and to work to the other and to examine each detail in sequence. It is always preferable to complete the inspection in one operation but, if for any reason an interruption occurs, an adequate reference of the position reached should be made to ensure that the inspection will be recommenced from that point.

7.2 It has been mentioned in previous paragraphs, and is emphasised again here, that an inspector's responsibilities do not end at ensuring compliance with drawings, this being particularly true where prototype or modified systems are concerned. Of particular importance is the adequacy of clearances between moving parts of the system, and features of the adjacent structure to prevent chafing or fouling, the support afforded the system to prevent vibration and chatter, the alignment of component parts such as pulleys, chain wheels, tube guides, etc., to ensure that the system will operate smoothly and without strain, and the correct operation and co-ordination of component parts when the appropriate control is operated. Care is also necessary to ensure that all connections are "in safe", and are adequately and correctly locked. (See Leaflets **AL/3-1** and **BL/5-1.**)

7.3 It is essential to ensure that the moving parts of systems function correctly whilst the system is being operated, an inspection of such parts in the static condition only, may result in dangerous features being overlooked.

7.4 For information on the Board's Requirements for the duplicate inspection of aircraft and engine control systems reference should be made to Leaflets **AL/3-4** and **PPL/3-1.**

8 COMPLETE AIRCRAFT It will be appreciated that the inspection procedure for a complete aircraft will vary widely according to the complexity of design and equipment of the aircraft concerned. It is not possible, therefore, to deal comprehensively with the subject in this leaflet, but the following points are given for general guidance.

8.1 It should be ascertained that all the related inspections have been certified by a careful perusal of the complete inspection records.

NOTE: All inspection record cards should be numbered and inserted in the inspection record file in numerical sequence to ensure that the document is complete.

8.2 Some typical inspections and tests required on the complete aircraft are given below. It is important that, when all assembly and installation operations are complete, a careful inspection of the structure should be made for any damage which might have been sustained during these operations. Very special attention should be given to highly stressed parts and particularly panels of pressurised compartments, where minute bruises, scratches, jagged edges, etc., may be the starting point of serious fatigue cracking. In many instances useful information is given in related leaflets.

(i) Symmetry and rigging checks.

(ii) Installation and functioning of systems such as, hydraulic, pneumatic, electrical, and oxygen.

(iii) Engine installation, fuel systems including fuel flow checks, and oil system installation.

(iv) Installation of equipment such as instruments, de-icing and safety equipment, with their appropriate notices and instructions.

(v) An inspection of the whole aircraft for loose articles, dirt, leakages, damage to protective finishes and structure.

8.3 **Inspection Record.** Any modifications which are introduced subsequent to the certification of the prototype aircraft and which are embodied in a series aircraft, are recorded in the Inspection Record, as also are the results of any ground functioning tests, such as fuel flow tests, engine runs, undercarriage retractions, electrical resistance and bonding tests, rigging data, control movements, and so on.

8.4 **Final Inspection for Flight of Series Aircraft.** After weighing and determining the centre of gravity, final inspection for flight and compass swinging, a Civil Aircraft Inspection Record (A.R.B. Form 268) is raised, a Certificate of Final Inspection for Fitness for Flight is issued, and the aircraft is passed to the Flight Department to be tested in accordance with a Flight Test Schedule agreed between the manufacturer and the Board.

8.4.1 Any adjustments or replacements found to be necessary during flight testing must be acceptable to the inspection department. This ensures that the assembly standard is maintained and that full records are kept.

8.4.2 When flight testing is completed, the aircraft is prepared for despatch to the operator. In the meantime, the Civil Aircraft Inspection Record is completed by the inspection department. Documents, such as a copy of the current Aircraft Weight Schedule and the Initial Flight Test Schedule results, are also raised and passed to the Board who, having satisfied itself from the evidence provided, that the aircraft conforms with the approved design, and having inspected the aircraft concerned, forwards certain documents to the Minister of Aviation together with a recommendation that a Certificate of Airworthiness with, where applicable, the associated Flight Manual should be issued.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-5

Issue 1

15*th December,* 1965

BASIC

CONTROL OF AIRWORTHINESS

CONCESSIONS

1 INTRODUCTION This leaflet gives guidance on the basic principles involved in the issue of concessions. It outlines typical procedures which are acceptable to the Board and which will ensure that concessions are correctly applied for, are authorised by competent persons and satisfactorily recorded.

NOTE: It is common practice for operators of aircraft to use the term "concession" when referring to dispensation from the Board's requirements for aircraft maintenance, e.g. temporary extensions of component overhaul lives or maintenance check cycles. Special procedures apply to such dispensation which should not be confused with those described in this leaflet.

2 GENERAL For an aircraft to qualify for the issue and renewal of a Certificate of Airworthiness, it is essential that all materials, parts, assemblies and equipment shall have been inspected and accepted for conformity to the appropriate drawings and specifications. It is inevitable that some materials or items will be found, during or after manufacture, to deviate from the strict requirements of the drawings or specifications. Such items may nevertheless be accepted, provided that in the opinion of the responsible approved design and inspection organisations, they are airworthy, and the divergence from the relevant drawings and specifications are properly authorised and recorded by means of a satisfactory concession procedure.

2.1 A concession is an authorisation to accept a limited quantity of materials, parts, assemblies and equipment which are not strictly in accordance with the relevant drawings, specifications or other documents that define the design.

2.2 A.I.D. Ministry of Aviation regulations differentiate between divergencies which arise after manufacturing processes have been carried out, and divergencies for which it may be necessary to seek approval before manufacture is started, for example, the use of an alternative material. In the first case authorisation for acceptance is given by concession and in the second case by a production permit.

2.3 Procedures based on the system outlined in paragraph 2.2 are acceptable to the Board, although British Civil Airworthiness Requirements treats the authorisation for all such divergencies, as concessions.

2.4 During the development stage of an aircraft and its equipment, it is frequently necessary to fit components or parts which in some respects do not comply with the design requirements and are subject to some special limitation. Some firms engaged in the manufacture and development of aircraft and equipment may find it convenient to use concession procedure as a means whereby the design and inspection departments may control such items (see paragraph 3.1).

3 BASIC PRINCIPLES

3.1 **Prototype and Prototype Modified Aircraft.** The Board accepts the practice defined in paragraph 2.4 of this leaflet, provided it is applied only when an aircraft fitted with any such parts flies under the 'B' Conditions of the Air Navigation Order, or on a Special Category Certificate of Airworthiness endorsed for research and development. Parts subjected to this type of concession procedure must comply with the principles outlined in paragraph 3.2 before the aircraft is submitted for final certification in any category except the Special Category.

3.2 **Series aircraft and parts.** Chief Inspectors should ensure that applications for concessions are made only when this can be justified so that the procedure does not become an automatic means of accepting low standards.

3.2.1 All concessions must be authorised by the responsible approved design organisation, which, alone, is judged as competent to assess whether divergencies from the requirements of drawings or specifications, are relevant to safety. It is, however, the Chief Inspector's responsibility to establish the best possible standards of quality for his Company's products in conjunction with the design requirements.

3.2.2 When a concession is approved for acceptance by the design organisation it is implicit in the authorisation that the divergence from standard does not invalidate the original intentions.

3.2.3 A copy of all concessions authorised by the design office must be retained by the issuing authority.

3.2.4 The individual approval of concessions by the Board is not required. The responsibility for application and authorisation of concessions is delegated under Inspection and Design Approvals (Leaflet **BL/1-1**) to the Chief Inspector and Chief Designer. The Board's Surveyors will review the records of concessions in the course of normal supervision of Approved Organisations and prior to the issue or renewal of a Certificate of Airworthiness. In exceptional cases the Board will advise in respect of particular concessions.

4 PROCEDURE FOR MAIN CONTRACTORS In this context "main Contractors" are firms having A.R.B. approved inspection and design organisations, or firms producing raw material.

4.1 The Chief Inspector is required to devise a form, the title of which should indicate its function in relation to concessions. It is usual for the form to be entitled "Application for Concessions/Production Permits". The same form serves as "Authority to accept" when signed by the qualified representative of the design department. Provision should be made in the form for the following information:—

(i) Name of firm. If required, provision should be made for a sub-contractor using the form to enter his name as applicant.
(ii) Serial Number.
(iii) Date of application by inspection department.
(iv) Date of authorisation by design.
(v) Identity of the material, or part(s) which are the subject of the application, i.e. serial, part or drawing numbers.
(vi) Quantity of material, or parts for which the concession is sought.

(vii) Description of the divergence from the drawings or specifications for which the concession is sought.

(viii) Reference to any concession(s) previously granted on the materials or parts.

(ix) Authorised recovery action if any.

(x) Signature of the Chief Inspector or his authorised representative.

(xi) Observations and signature(s) of the appropriate qualified person(s) in the design organisation.

NOTE: When necessary, to define precisely the divergence from drawing or specifications and the authorised recovery action, adequate sketches should be associated with the concession form.

4.2 Although requirements for concessions are often initiated by production departments, it is normally the responsibility of the inspection department to decide whether a concession should be sought and to raise the concession application.

4.3 After submission of the application the appropriate member(s) of the design organisation must declare on the concession form, in clear terms, whether or not the particular concession is technically acceptable. It is also essential that sufficient information is given in the form, if necessary by appendices, so that the inspection department is in no doubt as to the standard to which the material or parts may be accepted. The form must be signed and dated by the appropriate member(s) of the design organisation.

4.4 When substantial numbers of concessions are being dealt with it is advantageous to issue a design department reference number which is entered on each concession form when technical approval is given. If this procedure is followed, the pre-printed serial number on the form applies at the application stage, while the design department reference number applies to the technical authorisation for acceptance.

4.5 It is the responsibility of the Chief Inspector to decide which concessions should be recorded in the inspection records of particular components, assemblies or parts. . In the case of serial numbered components or assemblies, any applicable concession reference numbers should be recorded in the relevant history record card or its equivalent.

5 PROCEDURE FOR SUB-CONTRACTORS Firms undertaking sub-contract orders which are subject to approved release may print their own concession form as detailed in paragraph 4.1 above. Alternatively, by arrangement between the Chief Inspectors, the forms issued by the main contractor may be used.

5.1 It is the usual practice for the sub-contractor's Chief Inspector to complete the concession form as appropriate for any concession sought, and to forward the form to the Chief Inspector of the main contractor. In due course the form is returned to the applicant when it will have been completed by the main contractor's design and inspection departments to indicate whether the concession is authorised or rejected.

5.2 When only very infrequent concession applications are made by a sub-contractor, the sub-contractor's Chief Inspector may submit details by means of a letter to the main contractor. The Chief Inspector at the main contractor then raises the concession form and, after design authorisation, a copy is sent to the sub-contractor as authority to release the goods.

5.3 Whenever a sub-contractor releases parts, etc., which have been the subject of concession, the relative concession reference number must be quoted on the accompanying Approved Certificate.

5.4 In general, parts or materials should not be released to a customer if there is any divergence from the drawings or specifications unless prior authority has been given by concession. An exception to this rule which is acceptable, is where the Chief Inspector of a customer gives prior instructions in writing which permit the release of incorrect parts or materials. In such cases precise details of the divergence from drawings or specifications should be entered in the Approved Certificate which should also be endorsed "Released subject to concession". The parts so released must be stamped with a special concession inspection stamp which may only be used under the specific direction of the sub-contractor's Chief Inspector.

5.4.1 The concession inspection stamp should be similar in design to the normal final inspection stamp except that a bold letter "X" should replace the inspector's individual identification number.

NOTE: For information on the design of inspection stamps see Leaflet **BL/2-1.**

5.4.2 Before despatch, the affected parts should be clearly and individually labelled (small identical parts may be bundled and labelled), and the following information should be given on the label:

(i) Name and address of sub-contractor.
(ii) Applicable Approved Certificate number and date.
(iii) Full description of the material or parts.
(iv) Quantity.
(v) An impression of the inspection stamp.
(vi) The words "Subject to further Inspection before Acceptance" in bold lettering.

5.4.3 Such parts should be placed in the quarantine store on receipt at the customer's works and must not be passed into the Bonded Store until authorisation is obtained through the customer's concession procedure, and the customer's inspector has stamped the parts with a final inspection stamp.

5.4.4 The application of the "X" stamp by the sub-contractor's inspection department will indicate that the part or parts so released are correct in every way except for the divergence from drawing specified on the Approved Certificate. Hence the application of the customer's final inspection stamp will indicate that the necessary authorisation for the concession has been received.

5.4.5 In the event of the application for concession being rejected, it is the responsibility of the customer's Chief Inspector to ensure that the parts are either destroyed or returned to the sub-contractor suitably identified.

5.5 In principle the Board does not accept verbal agreement for the granting of concessions, but it does recognise that such practices are occasionally necessary. Chief Inspectors must ensure that any concessions granted on this basis, are duly and properly authorised through the appropriate concession procedure before the affected part is built into an assembly.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-6

Issue 3

15*th December,* 1965

BASIC

CONTROL OF AIRWORTHINESS

STORES—PROCEDURE AND GENERAL INFORMATION

1 INTRODUCTION This leaflet gives guidance on the establishment of approved stores, general storage procedures and the bonded storage of aeronautical supplies for civil and, where applicable, military use.

NOTE: Guidance on storage conditions, which formed part of Issue 1 of this leaflet, is now given in Leaflet **BL/1-7.**

1.1 The responsibility for ensuring that a suitable stores procedure is established and maintained is vested in the Chief Inspector of the firm's Inspection Organisation or the Chief Storekeeper of a firm solely approved as a stockist.

1.2 Chapter **A7-5** of British Civil Airworthiness Requirements, dealing with the approval of Inspection Organisations, prescribes that (a) a Quarantine Store must be provided for materials and parts until such time as they are proved to conform to specification and/or drawing, (b) where applicable, a Bonded Store must be provided for materials and parts proved to conform to specification and/or drawing and (c) that the form of Approved Certificate used for the release of materials or parts must be approved by the Board. These requirements are interpreted in later paragraphs.

2 APPROVED ORGANISATIONS With certain exceptions, parts and equipment used on civil aircraft of British manufacture must be fabricated from materials conforming to specifications acceptable to the Board (Chapter **A6-6** of British Civil Airworthiness Requirements) and in accordance with the drawings produced by Design Organisations approved by the Board (Sub-Section A7 of British Civil Airworthiness Requirements). Furthermore, the suppliers of such materials and parts must be organisations approved by the Board for that purpose (Chapter **A7-5** of British Civil Airworthiness Requirements).

2.1 A number of firms provide specialist services, e.g. protective treatment, heat treatment, non-destructive and mechanical testing, chemical analysis, etc., and here again only the services or organisations specifically approved by the Board for such functions may be utilised.

2.2 Each firm holding the Board's inspection approval, is given an Authority Reference Number, prefixed by the letters AI. The number consists of four digits, followed by the last two figures of the year in which the firm was approved, e.g. AI/0000/63.

NOTE: A book entitled "Organisations Approved by the Air Registration Board under the Air Navigation Order", is published annually by the Board and contains a list of all currently approved organisations, the broad terms of their approval, and the applicable Authority Reference Number.

3 APPROVED CERTIFICATES The existence of an inspection stamp is not in itself sufficient evidence of approval of materials, details or components; Approved Certificates, which must be signed by an approved signatory, are also required, and these documents, as applicable, should be held available for examination when an aircraft is inspected for the issue or renewal of a certificate of airworthiness. To ensure compliance with the Board's requirements in this respect, all materials and parts, or parts subjected to special processes, must be released to the consignee under the authority of an Approved Certificate (see also paragraph 6), the essential conditions for which are given in paragraphs 3.1 to 3.4.

3.1 Approved Certificates may be considered as being certificates of conformity, either of materials or finished or partly finished parts, but in no circumstances should an Approved Certificate be issued in respect of a defective or unserviceable part or component. Firms releasing items which can be categorised as modified, overhauled, repaired or rectified must clearly indicate the category on the accompanying certificate. Where applicable, approved stockists should record the manufacturer's recommendations for the heat treatment of raw materials on (or on a document accompanying) the Approved Certificate.

NOTE: Information on the procedure applicable for the despatch of parts or components for overhaul or repair is given in paragraph 7.

3.2 The wording used to certify that the material or parts comply with the approved specifications and drawings must conform to an agreed formula.

3.3 The Authority Reference Number (paragraph 2.2) must be printed on the certificate.

3.4 Approved Certificates must bear a printed serial number and must be issued consecutively. If a certificate is raised and subsequently cancelled, the copies must be clearly marked in such a way as to indicate the cancellation. One cancelled copy should be retained in the firm's records.

3.5 Approved Certificates are of two types, i.e. those used by manufacturing firms and those used by approved stockists; typical examples, incorporating an agreed wording for certification, are shown in Figures 1 and 2. The minimum distribution of the certificates is one copy to the consignee and one copy for the consignor's records. These copies must be retained (see paragraph 4.3) by the consignee and the consignor, and made available to the Board when required.

3.6 The final form of the certificate must be approved by the Board, and any certificate not so approved, or which does not bear an Authority Reference Number, is of no value. (The time for such approval is when the printers' proofs are received by the firm.)

4 QUARANTINE STORES All newly received materials or parts must be placed in Quarantine Store until such time as it can be ascertained that they conform to specification and/or drawing requirements, that they bear evidence of prior inspection, and are free from damage in transit. When such conformance has been established, the materials or parts may be "batched" to enable their identity to be traced back to the incoming Approved Certificate whenever necessary.

1st Copy to Consignee

2nd Copy to File

APPROVED CERTIFICATE

Issued under Air Registration Board Authority:
Ref. No. AI/9001/53

Serial No: C/042

Contract No. ....

TO: ....
....
....

A. B. CROWN Ltd.
Foregate Works, Station Street,
HUGHENDEN WAYN

Sub-Contract Order No. ....

Advice and Inspection Note No. ....

Works Order No. ....

Identification Mark and/or Serial No.	Description—with Part No.	Quantity	Spec. and/or Drawing—with Issue No. or Reference	Cast and/or Batch No.	Details of Test(s) or Test Report Number(s)	Inspector's Stamp

Certified that the whole of the materials and/or parts detailed hereon have been manufactured, tested and inspected and, unless otherwise stated above, conform to the full requirements of the appropriate drawings and/or specifications relative thereto in accordance with the conditions of the Air Navigation Order and British Civil Airworthiness Requirements.

Signed ....

For and on behalf of
A. B. CROWN LTD.

Date ....

Figure 1 APPROVED CERTIFICATE FOR MANUFACTURING FIRMS

1st Copy to Consignee

2nd Copy to File

APPROVED CERTIFICATE

Issued under Air Registration Board Authority:
Ref. No. AI/9000/53

Serial No: C/26753

Contract No. ....

TO: ....
....
....

J. R. BLANK & Co.
Town Works, North Avenue,
SOUTHTOWN

Sub-Contract Order No. ....

Advice and Inspection Note No. ....

Works Order No. ....

Description—with Part No.	Quantity	Specification	Batch No.	Test Report Number(s)	Inspector's Stamp	Incoming Approved Certificate No.

Certified that the whole of the materials and/or parts covered by this Certificate have been received under cover of the Approved Certificates or Release Notes quoted hereon, and are re-issued under the conditions of the Air Navigation Order and British Civil Airworthiness Requirements.

Signed ....

For and on behalf of
J. R. BLANK & CO.

Date ....

Figure 2 APPROVED CERTIFICATE FOR STOCKISTS

4.1 A "goods received" record should be kept in the Quarantine Store and when each consignment of goods is cleared it should be given a code number, goods received number or a batch number. In each instance, the number should appear in the book in a numerical sequence, and beside it should be written the Approved Certificate number, the date of receipt, the name of the despatching firm, details of the materials and parts, and any other relevant information.

4.2 When the various items of an Approved Certificate are similar, for example light alloy sheets of different gauge, it is recommended that each item on the Certificate is given a separate batch number. The batch number of large items of raw materials should, where applicable, be applied to the actual parts, but with small items, e.g. bolts, it is permissible to apply the batch number to the container.

4.3 When the Approved Certificate, and any endorsements thereon are found to be acceptable, the Certificate should be filed, together with any relevant documents, and retained for a minimum period of five years, but in any case it should not be destroyed during the period the material represented is held in stock. In the case of major assemblies or components the documentation should not be destroyed without the prior agreement of the Board.

4.4 Where a colour identification scheme is used for raw materials (Leaflet **BL/2-2**), the appropriate colour code should be applied to the material before it is deposited in the Bonded Store. Temporary protective treatments should be applied or repaired as necessary.

4.5 The Quarantine Store must be kept separate from the Bonded Store, and it is essential to ensure that no materials or parts can reach the Bonded Store, or be issued to shops, until they have been released by the Quarantine Store inspection department.

5 BONDED STORES The Bonded Stores should contain only those materials or parts which have been proved to conform to specification and/or drawing. Materials or parts which are stocked for reasons other than aeronautical purposes should not be included in this Store.

5.1 New parts coming into the Bonded Store may be manufactured to a later issue of drawing than those held in stock. In most organisations it is a function of the design office (usually through the medium of the planning department) to inform stores as to the modification, disposal or conditions of issue, applicable to parts not conforming to the latest issue of drawing, but in instances where such information is not available, the suitability of the parts for issue to modification or repair kits, which may be sent to places where full facilities for checking might not be available, must be considered.

5.2 In the majority of organisations, materials or parts can be drawn from Stores on the presentation of a requisition which forms part of a history card system. Irrespective of the system used, it is essential that where applicable, the batch number of the material or parts should be written on a record by the storekeeper to ensure that it is possible at any time to trace the material or part, through the batching system or other appropriate documents, to the incoming Approved Certificate.

5.3 When parts of sheets, bars, sections, etc., are issued to shops, those parts of the material bearing the identification markings should be retained until the last issue.

6 BONDED STORAGE OF SUPPLIES FOR CIVIL AND MILITARY AIRCRAFT

6.1 At the works of some firms the production of supplies for civil and service aircraft runs concurrently and, since there are many cases where supplies for civil and service aircraft are apparently identical, but where in fact there are important differences in requirements, Chief Inspectors may be faced with difficulties on the conditions to which sub-contracts should be placed and the segregation of civil and service supplies. To cover such circumstances and with the co-operation of the Chief Inspectors, the Board and the Director General of Inspection (D.G.I.) have agreed to the following:—

6.1.1 Separate ordering of civil and service aeronautical supplies is essential unless the requirements of the Board and the M.o.A. are identical, both in respect of design and inspection. Orders should be placed to the normal conditions of contract, i.e. A.N.O. conditions for civil supplies and Contracts Form 6/49 for service supplies. However, in the case of metallic materials where the requirements are the same or compatible, contractors may place common orders for such materials to the conditions of both the A.N.O. and Contract Form 6/49, and in the case of electrical or electronic components which are governed by specifications and requirements acceptable to both D.G.I. and the Board, common ordering procedure may also be adopted. All such orders are known as "Common Aeronautical Supplies".

6.1.2 Where supplies are released under the procedure outlined in paragraph 6.1.1 above, they may be stored in common bins as there is no need to differentiate between civil and service items. Where supplies are released certified as complying with 6/49 Conditions only, or with A.N.O. Conditions only, then segregation is essential unless alternative arrangements have been agreed by the D.G.I. Supervising Inspector and the local A.R.B. Surveyor.

6.2 **Metallic Materials.** Metallic materials (e.g. bars, extrusions, sheets, tubes, wires, castings and forgings) can be regarded as "Common Aeronautical Materials" when the same basic specification applies and, in the case of castings and forgings, when the same drawings apply and when any other technical considerations are the same or compatible.

NOTE: Basic specifications include British Standards, D.T.D., D.E.F. Specifications and such firm's specifications as are approved both by the Board and the D.G.I.

6.3 **Ordering.** All orders for Common Aeronautical Supplies must quote A.N.O. and Contracts Form 6/49 conditions and must be endorsed "Common Aeronautical Supplies". With this endorsement a joint Approved Certificate/Release Note must be issued, such issue being confined to manufacturers holding both A.R.B. and M.o.A. Inspection Approval.

6.3.1 Manufacturers who use a combined Release Note/Approved Certificate to cover the delivery of "Common Aeronautical Supplies", are required to submit a draft certificate to their local A.R.B. Surveyor and to their D.G.I. Supervising Inspector for approval.

6.3.2 Supplies already ordered and released to Contracts Form 6/49 Conditions only, may be used on civil aircraft provided the prior permission of the local A.R.B. Surveyor has been obtained in writing.

6.4 Items in respect of which there are concessions limiting the application or affecting the performance of the item in any way, may still be treated as "Common Aeronautical Supplies" provided such concessions have been agreed by both D.G.I. and A.R.B. In other cases, such items are to be released under Contracts Form 6/49, or A.N.O. Conditions, as applicable.

7 COMPONENT DISPATCH—OVERHAUL OR REPAIR Instances may arise where a firm has made arrangements with other organisations for the overhaul, repair or rectification of parts or components. In these circumstances the inspection department of the consignor should ensure that suitable records are prepared which will enable the inspection department of the consignee to verify the basic integrity of the parts or components and permit eventual release under cover of an Approved Certificate.

7.1 A serial numbered Advice Note bearing all the necessary details should be raised by the inspection department of the consignor and this should be endorsed with the following clause: "Certified that the parts/components detailed above will, subject to satisfactory overhaul/repair/rectification/modification and inspection, qualify for release in accordance with the conditions of the Air Navigation Order and British Civil Airworthiness Requirements."

7.2 A label should be attached to the part or component bearing the necessary identification with a cross reference to the advice note. Inspection should also ensure that the packaging is adequate to avoid damage in transit and, where applicable, that precautions have been taken against corrosion or the ingress of extraneous matter.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-8

Issue 2

15*th December*, 1965

BASIC
CONTROL OF AIRWORTHINESS
CERTIFICATION

1 INTRODUCTION This leaflet gives guidance on current legislation and requirements concerning the maintenance of aircraft.

1.1 A list of definitions relative to the text is given in paragraph 8.

1.2 Guidance on the general functioning of an inspection organisation is given in Leaflet **BL/1-2.** The keeping of aircraft, engine and propeller log books is covered in Leaflet **ML/1-1,** and the interpretation of legislation and requirements is given in Leaflet **BL/1-9.**

2 AIRWORTHINESS OF AIRCRAFT Article 4 of the Air Navigation Order, 1960, prescribes (with some reservations) that an aircraft must not fly unless there is in force in respect of it a certificate of airworthiness, duly issued or rendered valid under the law of the country in which the aircraft is registered, and that any conditions or limitations subject to which the certificate was issued are complied with.

2.1 Article 5 of the Air Navigation Order, 1960, prescribes that the Minister of Aviation may issue a certificate of airworthiness in respect of any aircraft provided he is satisfied that the aircraft is fit to fly, having regard to the design, construction, workmanship and materials of the aircraft and of any equipment carried in the aircraft which is considered necessary for the airworthiness of the aircraft, and the results of flying trials and such other tests of the aircraft as may be required.

2.2 The issue of a certificate of airworthiness indicates that an aircraft is considered to be fit to fly for the purpose indicated by the categories in which it is certificated. The purpose of maintenance is to ensure that the aircraft is kept to this standard of airworthiness throughout its service life, and the current legislation and requirements in this respect are described in the following paragraphs.

NOTE: Information regarding the categories of aircraft and the purposes for which they may fly is given in the Third Schedule of the Air Navigation Order, 1960.

2.3 **Renewal of a Certificate of Airworthiness.** The majority of aircraft above 5,000 lb. total weight are maintained to an Approved Maintenance Schedule which provides for maintenance being completed on the aircraft on a progressive basis. In such cases, since there is no one time when the complete aircraft may be inspected, the Certificate of Airworthiness may be renewed provided all the necessary work and inspections required have been completed to the satisfaction of the Board's Surveyor and a satisfactory test flight has been completed.

2.3.1 Where aircraft are not maintained to an Approved Schedule an Inspection Report must be prepared detailing all the work required to maintain the airworthiness of the aircraft, and in preparing this report, due regard should be paid to work already certified in the log books (Leaflet ML/1-1) and the maintenance records of the aircraft, and to the periods between overhaul which are prescribed or approved by the Board with respect to the aircraft and its parts (paragraph 3.6). The Inspection Report must be submitted to the Board's Surveyor who will examine it and inspect the aircraft. Any additional work required by the Surveyor must be carried out.

2.3.2 Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation or the appropriately licensed aircraft engineer, as applicable, must satisfy himself that the work has been carried out, inspected and, where necessary, tested, in conformity with the specifications, drawings, and instructions relating to the approved design. Full particulars of the work done must be entered in the log book or appropriate technical record and a Certificate of Compliance appended (see paragraph 6). At this stage the Board's Surveyor will complete his final inspection of the aircraft and all related records, and if satisfied, will renew the Certificate of Airworthiness.

3 MAINTENANCE SCHEDULE Article 6 of the Air Navigation Order, 1960, prescribes that an aircraft registered in the United Kingdom must not fly for the purpose of public transport or dropping or projecting any material for agriculture (see paragraph 7), public health or similar purposes unless the aircraft, together with its equipment and radio station is maintained in accordance with maintenance schedules approved by the Minister in relation to that aircraft.

3.1 In practice, maintenance schedules are approved by the Board under the authority delegated to it by the Minister of Aviation, and the Board's requirements in respect of maintenance schedules are prescribed in Chapter **A6-4** of British Civil Airworthiness Requirements.

3.2 To comply with Chapter **A6-4,** maintenance schedules must contain the information listed below:—

(i) The registered name and address of the operator.
(ii) An identity number or reference number, issue number and date.
(iii) The type of aircraft, engines and propellers (where applicable).
(iv) The route on, or the area, in which the aircraft is to be operated.
(v) The class of work to be undertaken in respect of item (iv).
(vi) The periods at which each part of the aircraft, including its engines, propellers, accessories, instruments, equipment and apparatus, and their installation, must be inspected.
(vii) Type and degree of inspection required by item (vi).
(viii) Periods at which parts mentioned in (vi) above must, as appropriate, be checked, cleaned, lubricated, adjusted and tested.
(ix) Periods at which overhauls and replacements must be made.

3.3 In addition, amendments which may from time to time be required by the Board must be incorporated in the maintenance schedule.

3.4 The data contained in an approved schedule must be reviewed as the need arises by the operator to ensure that it is amended to reflect, for example, maintenance experience, the effects of embodiment of modifications or the incorporation of the requirements of manufacturer's service bulletins. Such amendments shall not be embodied without the written consent of the Board.

3.5 The Air Navigation Order, 1960, specifies that aircraft having a total weight of more than 5,000 lb. must not fly for the purpose of public transport otherwise than under and in accordance with the terms of an Air Operator's Certificate. Before issuing an Air Operator's Certificate the Director of Aviation Safety, Ministry of Aviation, will require to be satisfied as to the competence of the Operator to secure the safe operation of the aircraft. In this connection so far as matters of engineering competence are concerned, the Director will seek the advice of the Board.

NOTE: Although Chapter **A6-4** states that the operator should ensure that the following conditions are complied with to the satisfaction of the Board, for the purpose of this leaflet, it also includes maintenance organisations under contract to an operator.

3.5.1 A sufficient number of skilled engineering staff, including appropriately licensed aircraft engineers, should be available for the work to be undertaken.

NOTE: It should be ensured that the number of skilled personnel is always adequate for the work in hand and that no deterioration of staff organisation has occurred since the maintenance schedule was originally approved. Periodical checks of the laid down inspection control procedure should also be made.

3.5.2 Sufficient hangar space and lighting facilities should be available for the work to be undertaken.

3.5.3 Sufficient equipment and working facilities should be available for the work to be undertaken, and periodic checking of all mensuration and test equipment should be made and recorded.

NOTE: The cleanliness of hangars, workshops and equipment has a direct bearing on the cleanliness of aircraft and their systems and the importance of this cannot be over emphasised; Leaflet **BL/1-3**, which deals with cleanliness of aircraft, should be read in conjunction with this leaflet.

3.5.4 Suitable quarantine and bonded stores should be provided together with a suitable stores record system.

NOTE: For information on storage procedures and storage conditions, reference should be made to Leaflets **BL/1-6** and **BL/1-7**.

3.5.5 The operator should have available current technical literature, drawings and mandatory requirements relating to the aircraft concerned, and should have an arrangement with the manufacturers to be notified of all amendments or re-issues of such literature and drawings.

3.5.6 A suitable system of technical records and facilities for filing such records should be maintained to ensure the effective control of lifed items, modifications and defects. Special attention should be given to repetitive defects and action should be initiated to eliminate them. Sufficient office accommodation should be available for licensed engineers and inspection staff to perform their duties effectively.

3.5.7 Before an operator intends carrying out any part of the maintenance specified in the approved maintenance schedules at a route station, he must ensure that acceptable facilities are provided and that appropriately licensed aircraft engineers are available for certification purposes.

3.5.8 Such additional maintenance facilities as may, in the opinion of the Board, be necessary for a particular type of operation, must be provided.

3.6 Periods Between Overhaul.

3.6.1 The period between overhaul of a part that may tend to become unairworthy after a given period of service, is determined by the Board initially in collaboration with the manufacturer. This period may be varied from time to time. The Board will consider applications for the extension of lifed items and periods between overhauls subject to submission of satisfactory operational experience of the appropriate unit or assembly by the operator.

3.6.2 Provided the documentary evidence is satisfactory, the Board will authorise in writing the continued use in service of a stated number of parts for the proposed extended period. A careful record must be kept of the behaviour of the parts during the extended period of service and, when the period has been completed, a detailed report on the condition of the parts must be prepared. This report and the parts must then be held at the disposal of the Board and, on the basis of the record and the report, the Board will agree to what extent the period between overhaul can be extended.

4 CERTIFICATES OF MAINTENANCE Article 6 of the Air Navigation Order 1960, prescribes that an aircraft registered in the United Kingdom must not fly for the purpose of public transport or dropping or projecting any material for agricultural, public health or similar purposes unless there is in force in respect of that aircraft a Certificate of Maintenance certifying that the aircraft has been maintained in accordance with the approved maintenance schedule.

4.1 Certificates of Maintenance come into force upon being issued and only cease to be in force upon the expiration of the period of validity in elapsed time or flying time (whichever may be the sooner) as specified in the relevant maintenance schedule.

4.2 Certificates of Maintenance may be issued only by the following:—

(i) Appropriately licensed aircraft maintenance engineers or aircraft radio maintenance engineers.

(ii) A person whom the Minister has authorised to issue a certificate in a particular case, and in accordance with that authority.

4.3 The categories of engineers required to sign the Certificate of Maintenance, the periods at which it should be issued and the requirements for the method of certification are prescribed in the letter approving the maintenance schedule for the aircraft concerned. A typical Certificate of Maintenance form is shown in the following paragraph.

NOTE: A.R.B. Notice No. 3 defines the certification responsibilities of licensed aircraft engineers and makes reference to the certification responsibilities of members of Approved Inspection Organisations, whilst A.R.B. Notice No. 10 defines the ratings and categories of aircraft maintenance engineers' licences.

CERTIFICATE OF MAINTENANCE

Aircraft Type....................Nationality and Registration Marks......

Check completed prior to issue..................

I/We hereby certify that the above aircraft has been maintained and inspected in accordance with the approved maintenance schedule.

Category	Signature	Licence No.	Date
"A" (Radio)	....	....	....
"X" (Automatic Pilots) ..	....	....	....
"X" (Compasses) ..	....	....	....
"X" (Instruments) ..	....	....	....
"X" (Electrical)	....	....	....
"C" (Engines)	....	....	....
"A" (Aircraft)	....	....	....

Period of validity .... days or upon completion by the aircraft of .... flying hours from the date of certification, whichever is the sooner.

4.4 Before issuing a Certificate of Maintenance, licensed aircraft engineers must satisfy themselves that, on the basis of the information provided by the operator up to the time of issue of the certificate, all maintenance and inspections required to be carried out in accordance with approved maintenance schedules have been so carried out, and that all recorded defects have been rectified and properly certified.

4.5 Certificates of Maintenance must be issued in duplicate, one copy being carried in the aircraft Technical Log (paragraph 5) during its period of validity, the other being kept elsewhere than in the aircraft. However, it should be noted that certificates need not be carried in aircraft engaged in flights intended to begin and end at the same aerodrome.

4.6 Certificates of Maintenance must be preserved for a period of two years following the expiry of the period of validity, or for any further period as may be required in a particular case.

5 TECHNICAL LOGS The record of flying hours is associated with the Certificate of Maintenance and forms part of the Technical Log, and the commander of the aircraft must enter the times at which all flights begin and end. In addition he must enter particulars of any defect in any part of the aircraft or its equipment, or any incident which occurs during flight that has relevance to technical matters. Where no such defects are known to him the commander is required to make an entry to that effect, i.e. "Nil" return. Every such entry must be signed and dated by the commander of the aircraft.

NOTE: The procedures to be followed by the commander of the aircraft with regard to entries in the Technical Log are prescribed in Article 6 of the Air Navigation Order, 1960.

5.1 Technical Log entries required by the Air Navigation Order must be preserved for a period of two years following the period of validity or for any further period that may be required in a particular case.

5.2 Article 6 of the Air Navigation Order and Chapter **A6-8** of British Civil Airworthiness Requirements further prescribes that the operator of an aircraft registered in the United Kingdom which is to be used for the purpose of public transport or dropping or projecting any material for agricultural, public health or similar purposes must provide a Technical Log which must contain the following.

- (i) The registered name and address of the operator and the nationality and registration marks of the aircraft:—
- (ii) A valid Certificate of Maintenance (paragraph 4.5).
- (iii) A record sheet in which can be entered:
  - (a) Any defect in any part of the aircraft or its equipment, or any incident which occurs during flight that has relevance to technical matters.
  - (b) A copy of the Certificate of Compliance (paragraph 6) in respect of work done for the rectification of defects. This must be entered in such a manner as to be readily identifiable with the entry of the defect to which it relates.
- (iv) A record sheet in which can be entered times at which flights begin and end, and the quantities of fuel uplifted in terms of individual tanks prior to the commencement of each flight.
- (v) A statement of the categories of signatories required for the certification of maintenance in respect of each check applicable.
- (vi) A statement of the next check due in order to comply with the check cycle of the approved Maintenance Schedule.

5.3 All entries in Technical Logs required by Chapter **A6-8** must be made in duplicate with provision for one copy of each entry to be removed and retained elsewhere than in the aircraft.

6 CERTIFICATION OF INSPECTION, OVERHAULS, REPAIRS, REPLACEMENTS AND MODIFICATIONS TO AIRCRAFT Article 7 of the Air Navigation Order, 1960, prescribes that aircraft in respect of which a certificate of airworthiness is in force must not fly if any part of the aircraft or such of its equipment as is necessary for the airworthiness of the aircraft, has been inspected, overhauled, repaired, replaced or modified unless there is in force a Certificate of Compliance relating to the inspection, overhaul, repair, replacement or modification, as the case may be.

6.1 A Certificate of Compliance means a certificate that the part of the aircraft or its equipment has been overhauled, repaired, replaced or modified, as the case may be, in a manner and with material of a type approved by the Board and, in relation to inspection required by the Board, that this has been carried out in accordance with the requirements of the Board.

6.2 The Board's requirements regarding the issue of a Certificate of Compliance are prescribed in Chapter **A4-3** of British Civil Airworthiness Requirements. The certificate must contain particulars of the work done, the place at which the work was carried out and must identify the aircraft to which it relates. The certification is in the following manner:—

> I hereby certify that the inspection/overhaul/repair/replacement/modification specified above has been carried out in accordance with the requirements of Chapter **A4-3** of British Civil Airworthiness Requirements.
>
> (Signed) ....
>
> (Firm) ....
>
> A.R.B. Approved Ref.
> or Licence No. ....
>
> Date.......................

6.3 A Certificate of Compliance may be issued only by the following:

(i) Appropriately licensed aircraft maintenance engineers or aircraft radio maintenance engineers.

(ii) Authorised representatives of approved inspection organisations.

(iii) A person whom the Minister has authorised to issue a certificate in a particular case.

6.4 When the work involves a flying or engine control system, any duplicate inspection required must be certified before the relevant certificate of compliance is issued. (See Leaflets **AL/3-4,** Duplicate Inspection of Flying Controls and **PPL/3-1,** Duplicate Inspection of Engine Controls.)

NOTE: The term "authorised representative of operators approved inspection organisations" does not necessarily mean Licensed Aircraft Engineers, although it is desirable that persons authorised to certify the rectification of defects should be so licensed. A Chief Inspector, when granting authority to an individual, should, as far as possible, detail the actual items and operations for which he is giving authorisation and a record should be kept of all such authorisations and the basis upon which they were granted. The advice of the Board's Area Surveyor should be sought in cases where doubt exists regarding a suitable form of authority.

7 THE MAINTENANCE OF AIRCRAFT USED FOR AGRICULTURAL SPRAYING PURPOSES The Board has issued "Notice to Licensed Aircraft Engineers and to Owners of Civil Aircraft No. 56", in respect of the maintenance of such aircraft and, for convenience, the relevant text of this Notice is given below.

(1) Because of the highly corrosive effect of certain chemicals now in common use for aerial crop spraying and dusting, attention is drawn to the need for special care in the maintenance of aircraft used for this purpose.

(2) The Ministry of Aviation and the Board have decided that in respect of aircraft used for public transport duties, as well as for agricultural work, the approved maintenance schedules must be amended to include the additional maintenance which is necessary before public transport duties are recommenced following a period of agricultural flying. These additional maintenance checks will be mandatory and must be undertaken irrespective of the fact that the aircraft may not be due for inspection against the normal basic check cycle.

(3) The Ministry of Aviation has agreed that Certificates of Airworthiness of aircraft currently on the United Kingdom Register and engaged on agricultural operations may not be renewed unless evidence is available that maintenance has been carried out in accordance with the above-mentioned requirements.

8 DEFINITIONS In order to assist in the full understanding of this leaflet, certain definitions are given of some of the terms which require explanation.

(1) **Overhaul**—An overhaul is a major operation which involves dismantling and inspecting and which may necessitate bench testing for renewal of operational life. The complete work concerned with renewal of a Certificate of Airworthiness does not necessarily constitute overhaul and each work operation must be considered individually. Whenever doubt exists reference should be made to the Board.

(2) **Modification**—"Modifications to aircraft" are changes made to a particular aircraft including its components, engines, propellers, radio stations, accessories, instruments, equipment, and their installation, after issue of the Certificate of Airworthiness. Approval of such modifications, is based on compliance with chapter A4-1 of British Civil Airworthiness Requirements.

(3) **Replacement**—A replacement is a work operation which involves the removal and replacement of the same part or the substitution of another similar part. The opening and closing of inspection covers, access hatches, exits, cowlings, etc., is not considered to constitute replacement.

(4) **Repair**—A repair is any work relating to rectification which does not come under one of the previous headings.

(5) **Inspection**—The physical act of inspecting is part of any work which constitutes overhaul, modification, replacement or repair and such inspection is covered by the certification required for the work. Where the work is the inspection itself, such inspections requiring certification are indicated by the Board.

(6) **Commander**—Commander means a member of the flight crew designated as commander of the aircraft by the operator thereof, or failing such a person, the pilot who is for the time being the pilot in command of the aircraft.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.

BL/1-9

Issue 2

15*th December*, 1965

BASIC

CONTROL OF AIRWORTHINESS

INTERPRETATION OF LEGISLATION AND REQUIREMENTS

1 INTRODUCTION This leaflet gives guidance on the interpretation of legislation and requirements in respect of the airworthiness of civil aircraft in so far as such legislation and requirements affect licensed aircraft engineers and approved inspection organisations. In this respect it is important, in the first instance, to appreciate the essential difference between legislation (i.e. Statutory Instruments such as the Air Navigation Order (A.N.O.)) and requirements (i.e. British Civil Airworthiness Requirements (B.C.A.R.)).

1.1 Statutory Instruments are laid before Parliament and are approved by the Queen's Most Excellent Majesty in Council before promulgation. In this context Statutory Instruments constitute the law of the land relating to civil aircraft, as provided for by the Civil Aviation Act of 1949.

1.2 Part II of the Air Navigation Order, 1960, deals with Airworthiness and Equipment of Aircraft, and it is this part of the Order with which the Air Registration Board is particularly concerned. By means of the powers provided by the Civil Aviation (Air Registration Board) Order, 1960, the Minister of Aviation has delegated to the Board the responsibility for the formulation and publication of requirements in respect of the matters to which Part II of the A.N.O. relates, and for the investigation of the extent to which those requirements are complied with either generally or in a particular case.

1.3 The Board meets these particular responsibilities largely through the preparation and publication of British Civil Airworthiness Requirements, but also, where necessary, in particular applications, by other publications as listed in paragraph 2. The Board's published Requirements, interpret the legislation prescribed in Part II of the A.N.O., but comprise only the minimum requirements which must be met before recommendations can be made to the Minister of Aviation by the Board; in view of this, interpretation of B.C.A.R. against a background of current aeronautical knowledge is essential. Examples are given below.

1.4 Article 4(1) of Part II of the Air Navigation Order, 1960, prescribes (with certain reservations) that "An aircraft shall not fly unless there is in force in respect thereof a certificate of airworthiness duly issued or rendered valid under the law of the country in which the aircraft is registered, and any conditions subject to which the certificate was issued or rendered valid are complied with". Thus the Article establishes in law that a certificate of airworthiness must be in force before an aircraft can fly but prescribes no details as to how such a certificate can be obtained. Such details are prescribed in British Civil Airworthiness Requirements.

1.5 B.C.A.R. are sub-divided into eight Sections, as follows:—

Section A—General Information and Procedure
Section C—Engines and Propellers
Section D—Aeroplanes
Section E—Gliders
Section G—Rotorcraft
Section J—Electrical
Section L—Licensing
Section R—Radio

1.6 A simple example is as follows. Article 12(1) of Part II of the Air Navigation Order, 1960, prescribes that "Every flying machine and glider in respect of which a certificate of airworthiness issued or rendered valid under this Order is in force shall be weighed . . . " This requirement is taken into account in the procedural requirements in Chapters **A2-1** to **A2-5,** wherein it is prescribed that the aircraft shall be weighed. Further, Chapter **A5-1,** in dealing specifically with the weighing of aircraft, prescribes that "Aircraft shall be weighed at such times as the Board may require, under arrangements made by the Operator". In other words, the fact that the aircraft must be weighed is prescribed in the A.N.O., when it must be weighed is prescribed by the Board, but how it should be weighed is left to the constructor or operator to decide "against a background of current aeronautical knowledge".

1.7 The above illustrates the essence of the system of airworthiness control by the Board in conjunction with approved organisations and licensed aircraft engineers, i.e. the Board, in pursuance of the duties delegated to it by the Minister of Aviation, prescribes airworthiness requirements based on current legislation and approves organisations and licenses aircraft engineers, to both of whom may be further delegated some of the responsibility for ensuring that these requirements are put into effect, thus ensuring compliance with the law. (For guidance on the procedure for organisations seeking the Board's approval see Leaflet **BL/1-1.**)

1.8 Because the above principles are not always fully understood, it is sometimes suggested that the Board's B.C.A.R. are too vague, it not being appreciated that this lack of non-essential detail is a deliberate policy to allow all concerned with the design, construction and maintenance of aircraft the maximum flexibility within the framework of airworthiness. For example, B.C.A.R. does not prescribe the type of fuel system to be installed nor does it prescribe how it shall be installed, but it does prescribe requirements and tests which will ensure that the installed system will function correctly and efficiently in all conditions of service, provided it is properly maintained.

2 THE BOARD'S PUBLICATIONS Assistance on the interpretation of legislation and requirements is given in various of the Board's publications, those applicable being listed below, but where any difficulty is experienced in interpretation of the Requirements, the Board should be consulted.

2.1 **Handbook No. 1—Notes on the Air Navigation Order and Associated Legislation.** This handbook contains explanatory notes intended to assist in the use of the A.N.O. and the Board's Requirements, with particular reference to the issue and renewal of certificates of airworthiness and the maintenance of aircraft.

2.2 **Civil Aircraft Inspection Procedures.** Approved Organisations and Licensed Aircraft Engineers are required to follow procedures acceptable to the Board. Civil Aircraft Inspection Procedures (C.A.I.P.), of which this leaflet forms part, give guidance on workshop methods and processes, and on the construction and maintenance of aircraft. Into C.A.I.P. are written the best practices and methods known to the Board, but this does not mean that the Board would find unacceptable any practices or methods which were equally suitable. Hence, so that such alternatives should not be excluded, the Procedures are published as recommendations rather than as mandatory requirements. However, as with B.C.A.R., the degree of useful application of the Procedures and their interpretation is dependent on the background knowledge of the user.

2.3 **A.R.B. Notices.** These Notices are a means of circulating essential information of an administrative or technical nature. A.R.B. Notices will in due course replace "Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft" which, as the opportunity arises, will either be re-issued as A.R.B. Notices or be cancelled as they become redundant.

2.4 **Mandatory Aircraft Modifications and Inspections.** Mandatory Modifications and Inspections are modifications and inspections which must, on the authority of the Board, be incorporated or enforced to ensure continued airworthiness. A Summary of Mandatory Modifications and Inspections is published by the Board and comprises a list of modifications and inspections which must be incorporated or enforced in British Registered Aircraft. The administrative details relating to mandatory modifications and inspections are summarised in Notice to Licensed Aircraft Engineers and to Owners of Civil Aircraft, No. 36.

2.5 **Extracts from Foreign Airworthiness Directives.** These directives are divided into two basic parts, (1) Airworthiness Directives extracted from the Airworthiness Directives Summary issued by the American Federal Aviation Agency and (2) Directives (or their equivalents) issued by Airworthiness Authorities other than the American Federal Aviation Agency which, for ease of reference are entitled "Extracts from European Airworthiness Directives". The extracts consist of modifications and inspections which are mandatory in respect of foreign aircraft registered in the United Kingdom.

3 PRACTICAL ASPECTS OF INTERPRETATION It has already been stressed in earlier paragraphs that requirements must be considered against a background of aeronautical knowledge and practical experience. Within this concept of practical interpretation, it is the duty of the engineers to consider fully the meaning that the Requirement is intended to convey; this can best be illustrated by the examples set out in the following paragraphs.

3.1 Chapter **A4-3** of B.C.A.R. deals with the certification of inspections, overhauls, repairs, replacements and modifications to aircraft. Paragraphs 2.2.2, 2.3.2, 2.4.3 and 2.5.3 of that Chapter prescribe that, after overhaul, repair, replacement or modification, as the case may be, "any tests necessary to ensure correct functioning shall be carried out". The phrase "any tests necessary" has been chosen deliberately to convey an exact meaning, i.e. for various reasons there may be no tests SPECIFIED in the relevant documents after, say, a repair has been carried out, but some tests may be NECESSARY (e.g. to ascertain that clearances are within allowable limits) and this can only be decided by the engineer or inspector in relation to the particular case, such decisions forming part of the responsibilities delegated by the Board to the licensed aircraft engineer or approved inspection organisation as a whole.

3.2 Chapter A7-5 of B.C.A.R. deals with the approval of inspection organisations. Paragraph 3.2.3 of that Chapter specifies that "A bonded store shall be provided for materials and parts proved to conform with specification and/or drawing". Since the inspection organisations of firms manufacturing widely varying products may be approved by the Board, as well as those of aircraft manufacturing and operating companies, detailed instructions cannot be prescribed in the Requirements. However, the Board clearly requires more than the mere provision of a storage room; consideration must also be given to such factors as suitable racks and bins, segregation of stock, temperature control, humidity control, cleanliness, etc., as well as a suitable recording system, but actual requirements can only be decided upon according to the nature of the stock.

3.3 The highest possible standard of airworthiness is the responsibility of all concerned in the construction, operation and maintenance of civil aircraft. Thus it is the duty of every responsible organisation and individual to comply, not only in fact but also in spirit, with published Legislation and Requirements.

Published by the Air Registration Board,
Brabazon House,
Redhill, Surrey,
England.